Comparing properties and profiles. Reply to Maarten Franssen

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COMPARING PROPERTIES AND PROFILES

REPLY TO MAARTEN FRANSSEN

I was happy to learn from the contribution of Maarten Franssen that at least one participant in the mega-research program *The dual nature of technical artifacts* of the Delft University of Technology has taken notice of the study of design research undertaken by Rein Vos, Hauke Sie and myself, that uses (medical) drug research as a paradigm example. In so far as his paper is an exposition of our analysis, it is very adequate. More importantly, it raises two very interesting issues, among them a very surprising analogy with Arrow's paradox. But let me start with two minor points. First, although SiS may not be entirely clear on this point, in ICR no doubt is left that "the truth" searched for in nomological research is not a "singleton," as long as the relevant set of nomic possibilities happens to contain at least two (non-isomorphic) possibilities. Second, it was very illuminating to read about the dependence of our distinction between structural and functional properties on the type of design, notably "fundamental design" (or innovation) versus "product design." Although one of our refinements already dealt with "indifferent properties," Vos, Sie and I certainly did not realize that they were more important for fundamental design than for our drug examples of product design.

The Double Comparative Nature of Properties

Franssen rightly notes that the model of intended and operational profiles characterized by subsets of relevant properties is rather naïve. However, I am happy to draw attention to the fact that Rein Vos (Vos 1991, Sections 6.2.3/4 and Appendix I; 1995, Sections 3.2/3) had already elaborated the following two refinements. First, instead of having a simple yes/no character, properties are here construed as functions with a range of more than two values, possibly even infinitely many. Second, instead of counting all relevant properties as equally important, some properties may here be more important than others,

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without the latter being negligible. The first refinement introduces the comparison of values of properties, the second the comparison of properties.

The first refinement starts with construing value spaces, that is, the Cartesian product of the ranges of values of the distinct properties. For further details the reader should consult the references, but one non-technical point is worth stressing here. Vos documents that, at least in medical drug research, it frequently occurs that one starts by grouping specific disease profiles into global disease profiles: for example, besides the normal condition, a mild, a moderate and a serious type of heart failure are distinguished, with similar groupings of intended and operational drug profiles. The second refinement – introducing relative degrees of importance of properties – may also be seen as a sophisticated way of dealing with the distinction between relevant and irrelevant properties. A general set-theoretical approach to this problem seems to become technically very complicated. However, Vos managed the technical elaboration (in Appendix I of his 1991) of the special case of one "dominant" characteristic, which, however, does not need to be present, among a number of relevant characteristics. E.g. a disease may have a "pathognomonic sign," that is, "a feature which is so typical for a certain disease that the physician will diagnose a patient with that feature, immediately and without doubt, as suffering from that disease" (Vos 1991, p. 353).

Analogy with Arrow's Paradox

Maarten Franssen is certainly right in pointing out that there is a strong formal analogy, even isomorphy, between ordering profiles and the construction of a group preference out of the preference orderings of its members, leading to Arrow's famous paradox, according to which it is, in general, impossible to realize a set of five very plausible conditions of adequacy. The analogy starts by comparing the preference ordering of one individual with the ordering of profiles relative to their scores on the set of values of one property. As soon as all the one-property orderings of profiles are not uniform, Arrow's problem may arise. Although I have nothing like a solution to offer, I would like to relativize the problem in two respects.

First, as Vos points out in the above publications, at least in the context of medical drug research this type of problem does not seem to occur frequently for two reasons. In particular profiles of actually occurring diseases and, as a consequence, the corresponding intended drug profiles, by aiming to counteract the problematic disease characteristics, can frequently be ordered in a uniform way. Moreover, this frequency may even be enlarged by the globalization of profiles indicated above. To be sure, Vos' proposal of ordering

is limited to such uniform cases and does not (implicitly) claim to handle Arrow-like problematic cases. It should be noted, however, that this relativization might not hold so easily for the operational profiles of various prototypes. But it is precisely for their comparison that a second relativization is important.

As a matter of fact, this second relativization is analogous to a relativization of the need for forcing an ordering of two theories when the one is not straightforwardly more successful (and hence, probably, more truthlike) than the other, a need that is presupposed by Zwart (cf. Note 4 in Franssen's contribution). However, in my view, the main research task in the case of divided success of theories is not to force an ordering, but to aim at a "dialectical synthesis," that is, to improve upon both. Similarly, in the case that operational (drug) profiles score dividedly relative to an accepted unique intended (drug) profile, the ultimate task is to improve upon both prototypes. Of course, for practical purposes, forcing some ordering of theories and prototypes (conceived as products) may have to be undertaken. Be this as it may, in all these four cases (nomological and design research and their application) there is a strong disanalogy with group preferences. In the latter case there is – at least we may hope so – no target ordering that is independent of the existing preferences, whereas the former cases are guided by such a target, whether it is known, as in the case of design research, or hidden, as in the case of nomological research.

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